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PLAN FOR PHASE II
SUBSURFACE INVESTIGATION
AT DOUGLAS AIRCRAFT COMPANY'S
C6 FACILITY IN
LOS ANGELES, CALIFORNIA

Prepared for:

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Project No. 41863B
Revised 24 August 1987

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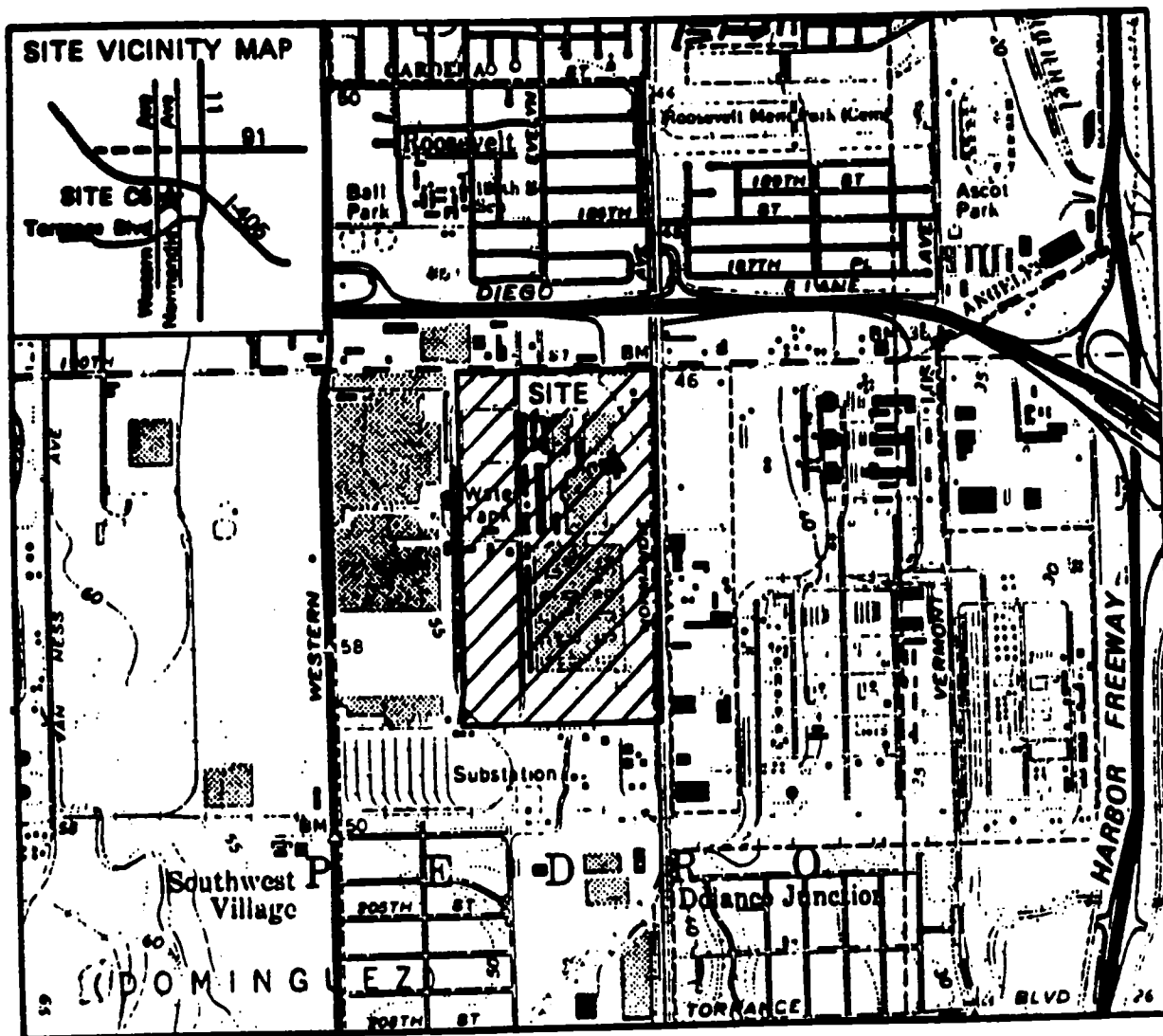
PLAN FOR PHASE II SUBSURFACE INVESTIGATION
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1.0 INTRODUCTION

The purpose of this plan is to present Woodward-Clyde Consultants' approach to evaluating the extent of halogenated organic compounds and/or petroleum hydrocarbons (fuel oil) present in the soil and ground water at Douglas Aircraft Company's C6 Facility at 19503 South Normandie in Los Angeles. Figure 1 is a facility location map. The piping associated with Tanks 19T and 20T was the suspected source of fuel oil compounds released at the facility. No potential source of halogenated organic compounds has been located in the vicinity of Tanks 19T and 20T.

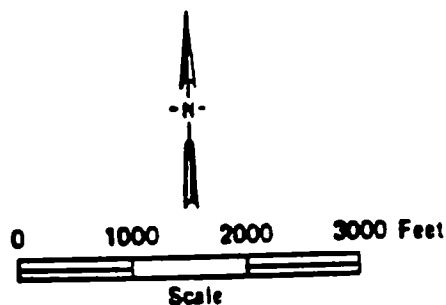
Woodward-Clyde Consultants has completed a preliminary investigation of the extent of fuel oil in the soil, near Tanks 19T and 20T. The results of the preliminary investigation indicated the presence of fuel oil to at least 50 feet below the surface inside Building 41, near the suspected source of the leak. Boring B-1 and Well WCC-1 installed outside of this building did not encounter fuel oil in the soil, indicating that the lateral extent of fuel oil is probably confined to the building. The boring and well locations are shown in Figure 2.

Ground water samples from the monitoring well (WCC-1) previously installed downgradient of Tanks 19T and 20T indicated the presence of the halogenated solvents TCE, 1,1,1-TCA, and 1,1-DCE, as well as benzene. These substan-



C6 FACILITY

▲ Approximate
Location of Tanks
19T and 20T



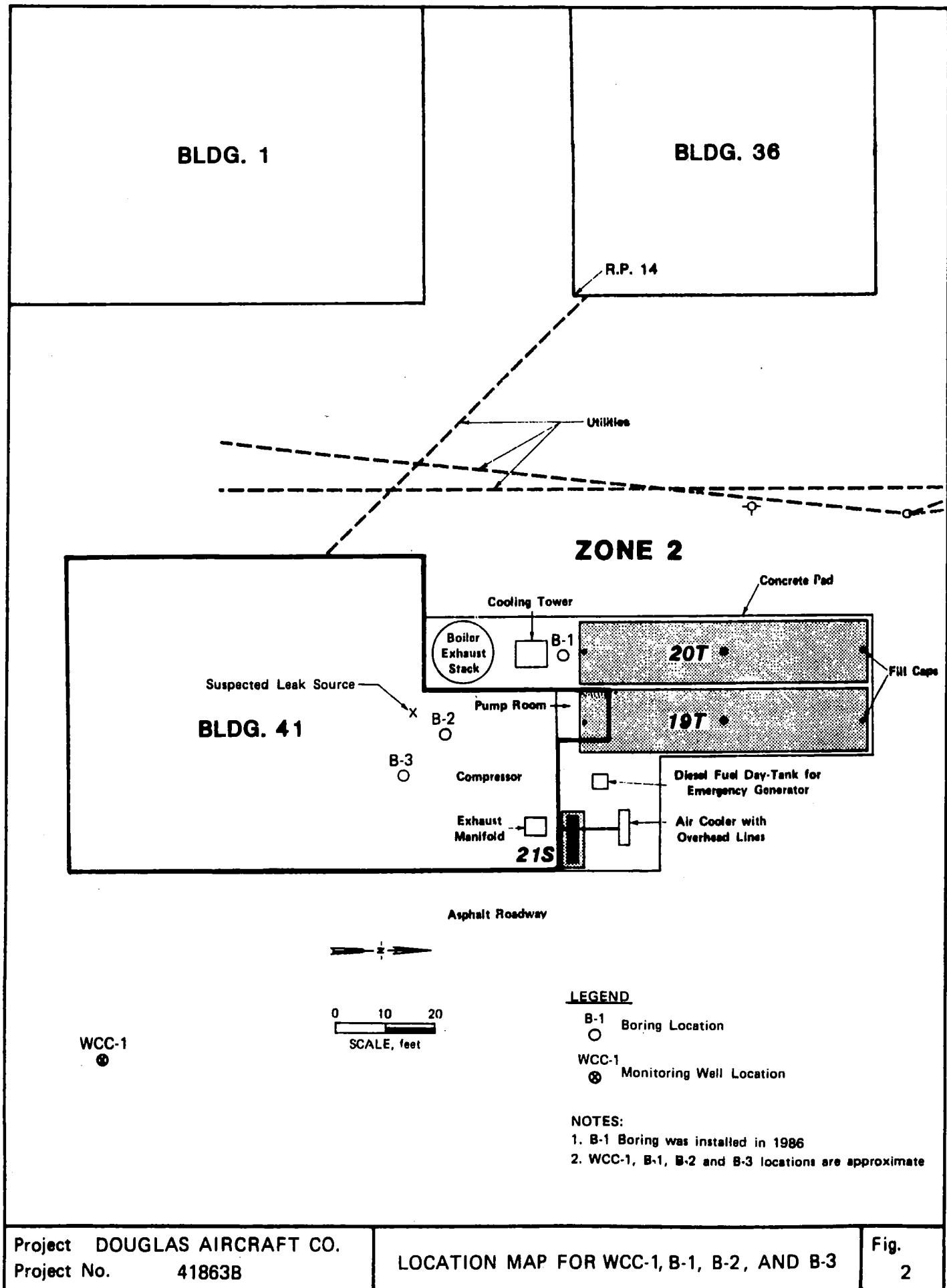
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FACILITY LOCATION MAP

Fig.
1

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ces are different from those expected to be present, if fuel oil was the source of the organic compounds in the affected ground water.

2.0 OBJECTIVE

The objective of this plan is to present a method of evaluating the source of organic compounds in the soil and ground water near Tanks 19T and 20T.

3.0 APPROACH

Woodward-Clyde Consultants proposes the following approach:

- o Installation of four additional 75-foot deep wells (WCC-2 through WCC-5). These wells, shown on Plate 1, will be located as follows:
 - Well WCC-2 will be located upgradient of both tank cluster 19T and 20T, and tank cluster 15T to 18T.
 - Well WCC-3 will be located between tank cluster 19T and 20T, and tank cluster 15T to 18T, but downgradient from tank cluster 15T to 18T.
 - Well WCC-4 will be located further downgradient of tank cluster 15T to 18T.

These wells will be developed and sampled, and the samples analyzed for volatile organic compounds by EPA Method 8240.

The direction of the ground water gradient will be verified using the information obtained by surveying in the elevation of these three new wells (WCC-2, WCC-3, and WCC-4), and the well originally installed (WCC-1).

Once the direction of the gradient has been established, a fourth new well (WCC-5) will be installed downgradient of both tank clusters, and near the property line. Well WCC-5 will be used to evaluate whether volatile organic compounds are present in water that is leaving the site. The precise location of Well WCC-5 will depend on the direction of the local ground water gradient, as determined from wells WCC-1 through WCC-4.

- Installation of one soil boring (B-4) inside the building near the suspected source of the petroleum hydrocarbons at tank cluster 19T and 20T, to evaluate whether the fuel oil has reached ground water at that location. This boring will not penetrate to ground water, which is approximately 72 feet below ground surface. Space constraints inside Building 41 limit the size of the drill rig that can be used. If it is not possible to install a deep (65-foot) vertical boring inside the building because of this constraint, then up to two slant borings will be installed from the outside of the building. The first boring will be installed to collect soil samples at depths up to 60 feet under the suspected source area. If the soil sample collected at 60 feet shows the presence of fuel oil, then another slant boring to a vertical depth of 65 feet will be installed. If this boring also contains hydrocarbons at 65 feet, another slant boring will be installed to a vertical depth of 70 feet.

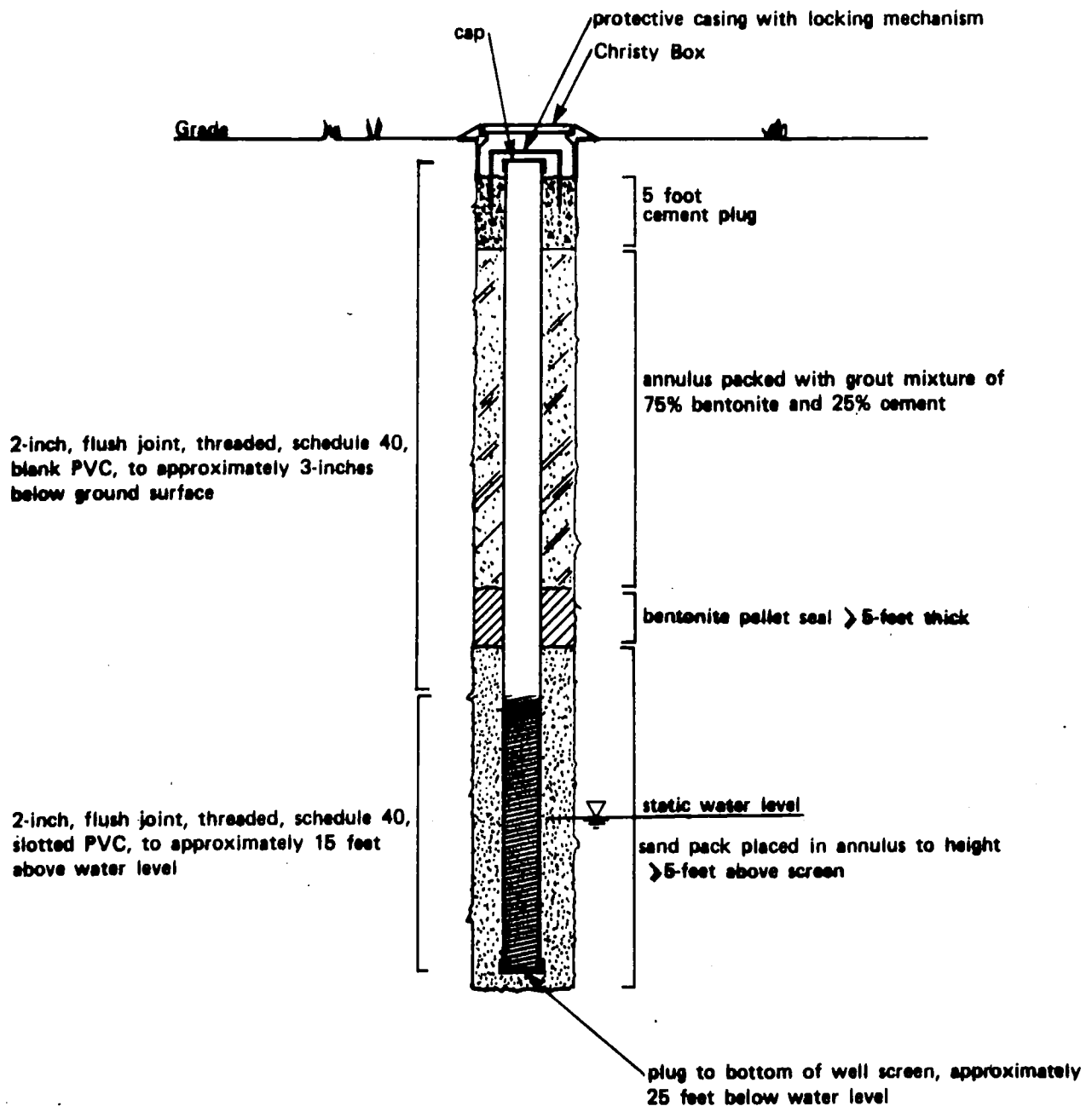
In developing the scope of this program, it was assumed that two slant borings will be required to define the vertical extent of the fuel oil in the soil. Samples will be collected at 5-foot intervals from these borings, and analyzed for petroleum hydrocarbons by Modified EPA Method 8015. One sample from each boring will be analyzed by EPA Method 8240 for volatile organic compounds, to evaluate whether halogenated organic compounds are present in the soil under Tanks 19T and 20T.

Appendix A contains details of well construction.

The information obtained from the work described above will allow an assessment to be made of potential sources of the organic compounds identified in the ground water near Tanks 19T and 20T.

mixture to within 5 feet of ground surface, using a tremie pipe, and then cement grouted to the surface around a secured water-tight, traffic-rated well cap. Details of the well construction are shown in Figure A-1.

Following installation, the wells will be developed until the continuation of settleable solids present in the extracted water is less than 10 ppm. The bailer used for sampling the wells will be cleaned utilizing the same procedure used for the sampling equipment. A stainless steel bailer will be used to sample the wells, and will be decontaminated prior to sampling at each well. The water samples collected will be placed in appropriate containers obtained from the analytical laboratory, stored at 4°C and delivered to the laboratory within 24 hours of collection. Chain-of-custody procedures will be followed.



NOT TO SCALE

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DESIGN OF
GROUND WATER MONITORING WELL

Fig.
A-1

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4.0 SCHEDULE

Woodward-Clyde Consultants proposes completing this field investigation and submitting a draft report to Douglas Aircraft Company within four to six weeks of receiving authorization to proceed, following approval of the Work Plan by the Regional Water Quality Control Board.

APPENDIX A

DRILLING, SAMPLING, AND WELL INSTALLATION PROCEDURES

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A.1 DRILLING OPERATIONS

The borings and wells will be drilled using a drill rig equipped with 10-inch O.D. hollow stem augers. Augers will be steam cleaned prior to entering the site. Cuttings from the borings will be placed in 55-gallon drums, sealed, labeled, and left adjacent to the borings until the appropriate disposal is authorized by regulatory personnel.

A.2 SAMPLING PROCEDURES

Soil sampling will be performed with a 2-inch I.D. modified California sampler, which contains four brass tubes measuring 4 inches long by 2 inches in diameter. The sampler will be driven to the sampling depth by dropping a 140 pound hammer approximately 30 inches. The number of blows (blow count) required to advance the sampler one foot will be recorded on the Boring Logs.

Brass tubes will be extruded from the sampler onto a portable field stand. The contents of one brass tube will be extruded into a glass jar, and a headspace Organic Vapor Analyzer (OVA) reading will be taken and recorded on the Boring Log. Another brass tube will be sealed with aluminum foil, PVC end caps, and electrical tape. This tube will be stored at 4°C and delivered to the laboratory within 24 hours of collection. Sample identification labels, a field logbook, and chain-of-custody form will be used to track the collection and delivery of samples.

Sampling equipment will be cleaned between sampling points using the following procedure:

1. Water rinse, assisted with brush, to remove dirt and mud;
2. Wash with Liquinox and water;
3. Rinse with deionized water; and
4. Dry with paper towels.

The brass tubes used in the modified California sampler will be cleaned in the Woodward-Clyde Consultants laboratory prior to use at the site, using a Liquinox and water wash, and a deionized water rinse. Prior to use at the site, the tubes and end caps will be stored in plastic bags.

A.3 WELL INSTALLATION AND SAMPLING

Monitoring wells will be constructed of 2-inch Schedule 40, flush-jointed, threaded PVC pipe, of which the bottom 40 feet will be slotted casing. Fifteen feet of this 40 feet will be above the ground water surface, and 25 feet will be below the surface. The actual slot size and type of sand pack will be selected based on a sieve analysis of the material in the formation at the depth where the well will be screened. The casing will be installed inside the hollow stem auger, and filter sand pack will be placed around the screen portion to about 5 feet above the screen. Augers will be retrieved while the sand pack is being placed around the screen. The remaining annular space will be backfilled with a 75 percent cement and 20 percent bentonite grout